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TITLE: A broadband direct-current amplifier with conversion

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TEXT: It is desired to construct a broadband direct-current amplifier based on mechanical choppers, which operate practically ideally at low chopping frequencies, and resistance-coupled amplifiers. The frequency response of this amplifier should be independent of the chopping frequency. When the synchronous detector of the ordinary chopper amplifier is replaced by a synchronous chopping circuit the constant and alternating

components of the input signal are amplified by the same amount. Two amplifying channels with half-cycle converters, each passing the signal during another half of the cycle, are used. If the two amplifiers are identical, summation of outputs of the two channels yields the amplified input signal. The pass-band of such an amplifier is practically unlimited and does not depend on the converter frequency. There are no side effects of the conversion in the output. This is shown for three essentially different frequency ranges. The assumptions on which this demonstration is based are: the converters and the damping circuits are ideal; each damping circuit operates in phase with the corresponding converter; the resistance-coupled amplifiers are identical and their transfer functions are constant for $\omega \geq \omega_N$ and zero for $\omega < \omega_N$. The pass-band of such an amplifier is limited in practice by the high-

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frequency fall-off in the frequency response of the resistance-coupled amplifiers and by the change-over time of the mechanical converters. The damping can be performed by a contactless vacuum tube or transistor circuit. The same can be said of the input conversion when the sensitivity specifications are not too rigid. Infra-low chopping frequencies can be used to lengthen the life of the mechanical choppers and to raise their reliability. The amplifier is simple enough. There is no need in low frequency input or output filters. Negative feedback that includes the input and output converters practically solves the problem of channel mismatch. Replacement of the resistance-coupled amplifiers by direct-coupled ones yields an amplifying device with dynamic coefficients similar to those of direct action amplifiers, though

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the zero stability is somewhat impaired. Highly sensitive drift-less direct-current broadband amplifiers can be built by this principle. There is 1 figure.

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